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(54) **AMPHIPHILIC MULTI-ARM COPOLYMERS AND NANOMATERIALS DERIVED THEREFROM**

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| USPC | 524/403 ; 524/402; 524/413; 524/430; 524/432; 524/433; 524/436; 525/190; 525/242; 525/298; 525/301; 977/754; 977/810; 977/811 |
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See application file for complete search history.

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ABSTRACT

The present invention relates to polymers, nanomaterials, and methods of making the same. Various embodiments provide an amphiphilic multi-arm copolymer. The copolymer includes a core unit and a plurality of amphiphilic block copolymer arms. Each block copolymer arm is substituted on the core unit. Each block copolymer arm includes at least one hydrophilic homopolymer subunit and at least one hydrophobic homopolymer subunit. In some examples, the copolymer can include a star-like or bottlebrush-like block copolymer, and can include a Janus copolymer. Various embodiments provide a nanomaterial. In some examples, the nanomaterial can include Janus nanomaterials, and can include nanoparticles, nanorods, or nanotubes. The nanomaterial includes the amphiphilic multi-arm copolymer and at least one inorganic precursor. The inorganic precursor can be coordinated to at least one homopolymer subunit of one of the amphiphilic block copolymer arms to form the nanomaterial. Various embodiments also provide methods of making the copolymer and the nanomaterial.